VIRUDHUNAGAR HINDU NADARS' SENTHIKUMARA NADAR COLLEGE
(An Autonomous Institution Affiliated to Madurai Kamaraj University)
Virudhunagar – 626 001.

Course Name : Bachelor of Computer Applications
Discipline : Computer Applications
(Who those joined in the year June 2023 and after)

Programme – Bachelor of Computer Applications

Programme Outcomes:

Undergraduate (B.C.A.,) is 3-year degree programme with 6 semesters consisting the following Programme Outcomes (POs) under various criteria including critical thinking, problem solving, effective communication, societal/ citizenship/ ethical credibility, sustainable growth and employable abilities.

PO 1 - Critical Thinking: Intellectual exploration of knowledge towards actions in clear and rational manner by understanding the logical connections between ideas and decisions.

PO 2 - Problem Solving: Understanding the task/ problem followed by planning and narrow execution strategy that effectively provides the solution.

PO 3 - Effective Communication: Knowledge dissemination by oral and verbal mechanisms to the various components of our society.

PO 4 - Societal/ Citizenship/ Ethical Credibility: Realization of various value systems/ moral dimensions and demonstrate the empathetic social concern as well as equity in all the decisions, executions and actions.

PO 5 - Environmental Concern and Sustainable Growth: Understanding the emerging environmental challenges and provide the possible contribution in sustainable development that integrates environment, economy and employment.

PO 6 - Skill Development and Employable Abilities: Adequate training in relevant skill sector and creating employable abilities among the under graduates.

Programme Specific Outcomes

PSO1: Understand, analyse and develop computer programs in the areas related to algorithms,web design and mobile application design.

PSO2: Acquire the knowledge of the necessary technical, scientific as well as basic managerialand financial procedures to analyze and solve real world problems within their workdomain.

PSO3: Apply standard software engineering process and strategies in software projectdevelopment using open source programming environment to deliver a quality productfor business success.

PSO4: Analyse and apply latest technologies to solve problems in the areas of computerapplications.

PSO5: Develop practical skills to provide solutions to industry, society and business.

PSO6: Articulate the relevance of latest computing technologies in shaping the life.

PSO7: Get acquainted with latest trends in technological development and thereby innovate new ideas and solutions to existing problems.

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PSO8: Demonstrate advanced skills in the effective analysis design and realization of system utilizing contemporary current technology.

SEMESTER I

Part	Course Code	List of Courses	Credit	Hours per week (L/T/P)
Part-I	U23PT11	Language – Tamil	3	6
Part-II	U23PE11	English	3	4
Part-III	U23CAC11	CC1 : Python Programming	4	5
	U23CACP11	CC2 : Python LAB	4	5
	U23CAE11	EC1 : Discrete Mathematics – I	3	4
	U23CAN11	SEC-1 (NME): Introduction to HTML	2	2
	U23CAF11	FC: Structured Programming Language in C	2	2
	U23CAAE11	AECC 1 :Communication Skills for Employment – I	2	2
			23	30

SEMESTER II

Semester	Part	Course Title	Hours	Credit	Marks			Course Code	Courses having focus on employability/ entrepreneurship/ Skill development	Revised / New /No Change / Interchanged/ Percentage of revision
					I	E	Total			
II	Part-I	Tamil	6	3	25	75	100	U23PT21	Employability	New
	Part-II	English	6	3	25	75	100	U23PE21	Employability/ Skill Development	New
	Core 3	Object Oriented Programming Concepts Using C++	5	4	25	75	100	U23CAC21	Skill development	Revised 40%
	Core 4	Lab:C++ Programming	5	4	40	60	100	U23CACP21	Skill development	Revised20%
	Allied 2	Optimization Techniques	4	3	25	75	100	U23CAA21	Employability	No Change
	SBE 2	Lab: Multimedia	2	2	40	60	100	U23CASP21	Skill development	New
	NME	Basics of Computer	2	2	25	75	100	U23CAN21	Skill development	New
	Total		30	21						

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II year BCA

Semester	Part	Subject Name	Hours	Credit	Int + Ext =Total	Local	Regional	National	Global	Professional Ethics	Gender	Human Values	Environment & Sustainability	Employability	Entrepreneurship	Skill Development	Subject Code	Revised / New / No Change / Interchanged & Percentage of Revision
III	Part 1	**Tamil**	6	3	25+75=100												**U24PT31**	**Inter change from II semester**
	Part 2	**English**	6	3	25+75=100												**U24PE31**	**New**
	Core 6	Java Programming	4	4	25+75=100				✔					✔	✔	✔	**U24CAC31**	**Mark Change**
	Core 7	**Digital Principles and Computer Organization**	4	4	25+75=100			✔						✔		✔	**U24CAC32**	**New**
	Allied 3	Computer Based Financial Accounting	4	3	25+75=100		✔							✔			**U24CCAA31**	**Credit Change**
	Core Lab 8	**LAB: Java Programming**	4	2	40+60=100				✔					✔	✔	✔	**U24CACP31**	**Revised 20%**
	SBE – 3 LAB	**LAB: Web Design**	2	2	40+60=100				✔					✔		✔	**U24CASP31**	**New**
	SL	**Value Education**	-	3	25+75=100							✔					**U24VE31**	**New**
	Total		**30**	**24**														
IV	Part 1	**Tamil**	6	3	25+75=100												**U24PT41**	**Interchange from III rd semester**
	Part 2	**English**	6	3	25+75=100												**U24PE41**	**New**
	Core 9	Relational Database Management System	4	4	25+75=100				✔					✔		✔	**U24CAC41**	**Mark change**
	Core 10	**Data Structure**	4	4	25+75=100				✔							✔	**U24CAC42**	**New**
	Allied 4	Principles of Costing	4	3	25+75=100		✔								✔	✔	**U24CCAA41**	**Credit change**
	Core Lab 11	**LAB: Relational Database Management System**	4	2	40+60=100				✔					✔		✔	**U24CACP41**	**Revised 30%**
	SBE – 4 LAB	**LAB: Data Structures**	2	2	40+60=100				✔							✔	**U24CASP41**	**New**
	SL	**Environmental Studies**	-	2	25+75=100								✔				**U24ES41**	**New**
	Total		**30**	**23**														
	Internship Programme during Vacation																	

Year	Part	Subject	Credit	Int = Total	Code
I & II	Part V	NSS / NCC / Physical Education / YRC / RRC	3	100 = 100	U22NS4 / U22NC4 / U22PS4 / U22YR4 / U22RR4

Year	Semester	Subject	Credit	Hours	Code
II	IV Semester Vacation	Internship / Industrial Training	2(Extra)	60	**U24IP51**

SEMESTER V

Semester	Part	Course Code	Course Title	Hours	Credit	Marks I	Marks E	Marks Total	Focus on Employability/ Entrepreneurship / Skill Development	Revised/ New/ No Change/ Interchanged. (If revised % of change)
V	Core 12		Operating System	4	4	25	75	100		
	Core 13		Data Communications and Networks	4	3	25	75	100		
	Core 14		Mobile Application Development Lab	5	2	40	60	100		
	Core 15		Web Technology Lab	4	2	40	60	100		
	Elective 1		Software Engineering Mobile Application Development / Mobile Computing	5	5	25	75	100		
	Elective 2		Web Technology / Data Mining / TCP/IP	5	5	25	75	100		
	NME		Basics of Computer	2	2	25	75	100		
	SBE - 5		Employability Skills	1	1		100	100		
	Total			30	24	205	595	800		

SEMESTER VI

Semester	Part	Course Code	Course Title	Hours	Credit	Marks I	Marks E	Marks Total	Focus on Employability/ Entrepreneurship/ Skill Development	Revised/ New/ No Change/ Interchanged. (If revised % of change)
VI	Core 16		Software Testing	4	3	25	75	100		
	Core 17		Cryptography	4	3	25	75	100		
	Core 18		Dot Net Programming Lab	4	2	40	60	100		
	Core 19		Software Testing Lab	4	2	40	60	100		
	Elective 3		Embedded Systems /Computer Algorithms / Cloud Computing	5	5	25	75	100		
	SBE - 6		Internet of Things	2	2	25	75	100		
	NME		Internet and Web Technology	2	2	25	75	100		
			Project and Viva Voce	5	3	40	60	100		
	Total			30	22	245	555	800		

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Core 6

Course Title :Java Programming	Total Hours :60 Hours
Course Code : U24CAC31	Total Credits : 4

Course Outcomes:

COs	CO Statement
CO1	Provide fundamental knowledge of java programming such as variables, Conditional and iterative execution, methods, etc.
CO2	Implementing object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
CO3	Understand error-handling techniques using exception handling.
CO4	Develop Applet and Graphics Programming.
CO5	Implement I/O functionalities to read from and write to text files.

Unit I   **12 Hours**

Java Evolution - Java History; Java Features; How Java Differs From C and C++; Java and Internet; Web Browsers; Java Environment.

Overview of Java language – Introduction; Simple Java program; More of Java; Java Program Structure; Java Tokens; Implementing a Java program; Java Virtual Machine; Command Line Arguments.

Constants, Variables, and Data Types – Introduction; Constants; Variables; Data Types; Declaration of Variables; Giving Values to Variables; Scope of Variables; Symbolic Constants; Type Casting; Getting Values of Variables.

Unit II   **12 Hours**

Operators & Expressions – Introduction; Arithmetic Operators; Relational Operators; Logical Operators; Assignment Operators; Increment and Decrement Operators; Conditional Operator; Bitwise Operators; Special Operators; Evaluation of Expression; Precedence of Arithmetic Operators; Type Conversion in Expression; Operator Precedence and Associatively; Mathematical Functions.

Decision making and Branching – Introduction; Decision Making With If Statement; Simple If Statement; The If...Else Statement; Nesting of If…Else Statement; The Else If Ladder; The Switch Statement; The ?: Operator.

Decision Making and Looping – Introduction; The While Statement; The Do Statement; The For Statement; Jump in Loops; Labelled Loops.

Unit III   **12 Hours**

Classes, Objects and Methods – Introduction; Defining a Class; Fields Declaration; Methods Declaration; Creating Objects; Accessing Class Members; Constructors; Method Overloading; Static Members; Nesting of Methods; Inheritance: Extending a Class; Overriding Methods;

Final Variables and Methods; Final Classes; Finalizer Methods; Abstract Methods and Classes; Visibility Control.

Arrays, Strings and Vectors – Introduction; One Dimensional Array; Creating an Array; Two Dimensional Arrays; Strings.

Interfaces: Multiple Inheritance – Introduction; Defining Interfaces; Extending Interfaces; Implementing Interfaces; Accessing Interface Variables.

Unit IV   **12 Hours**

Packages – Introduction; Java API Packages; Using System Packages; Naming Conventions; Creating Packages; Accessing Package; Using a Package; Adding a Class to Package; Hiding Classes; Static Import.

Multi Threaded programming – Introduction; Creating Threads; Extending the Thread Class; Stopping and Blocking Thread; Life Cycle of a Thread; Using Thread Methods; Thread Exceptions; Thread Priority; Synchronization; Implementing the Runnable Interface; Inter Thread Communication.

Managing Errors and Exceptions – Introduction; Types of Errors; Exceptions; Syntax of Exception Handling Code; Multiple Catch Statements; Using Finally Statements; Throwing Own Exceptions.

Unit V   **12 Hours**

Applet – Introduction; How Applet Differ From Applications; Building Applet Code; Applet Life Cycle; Applet Tag; Adding Applet to HTML File; Running an Applet; More About Applet Tag; Passing Parameters to Applet.

Graphics Programming – Introduction; The Graphics Class; Lines and Rectangles; Circles and Ellipses; Drawing Arcs; Drawing Polygons.

Managing Input/Output Files in Java – Introduction; Concept of Streams; Stream Classes; Byte Stream Classes; Character Stream Classes; Using Streams; Using The File Class; Creation of Files; Reading/Writing Characters; Reading/Writing Bytes; Random Access Files.

Text Books:

1. E. Balagurusamy, "Programming with Java A Primer", McGraw Hill Education India Pvt. Ltd., Fourth Edition, 2010.

Unit I	Chapter 2 (2.1, 2.2, 2.3, 2.4,2.6,2.9) Chapter 3 (3.1,3.2,3.3,3.5,3.6,3.9,3.10,3.11) Chapter 4 (4.1 to 4.10)
Unit II	Chapter 5 (5.1 to 5.9), (5.11 to 5.15) Chapter 6 (6.1 to 6.8) Chapter 7 (7.1 to 7.6)
Unit III	Chapter 8 (8.1 to 8.16, 8.18) Chapter 9 (9.1 to 9.5) Chapter 10 (10.1 to 10.5)
Unit IV	Chapter 11 (11.1 to 11.10) Chapter 12 (12.1 to 12.11) Chapter 13 (13.1 to 13.7)
Unit V	Chapter 14(14.1,14.2,14.4,14.5,14.8 to 14.12)

	Chapter 15(15.1 to 15.6)
	Chapter 16(16.1 to 16.5, 16.6, 16.8, 16.10, 16.11, 16.12, 16.15)

Reference Books:

1. Herbert Schildt, "The Complete Reference Java2", Tata McGraw Hill Ltd, 5[th]Edition, 2008.

e- Resources:

1. https://www.javatpoint.com/java-tutorial

2. https://www.geeksforgeeks.org/java/

3. https://archive.nptel.ac.in/courses/106/105/106105191/

4. https://www.codecademy.com/learn/learn-java

5. https://www.youtube.com/playlist?list=PLePkp1QLoDXS8heorFB9Z4Q0xHNEonha 5

Core 7

Course Title :**Digital Principles and Computer Organization**	Total Hours : **60 Hours**
Course Code : **U24CAC32**	Total Credits :**4**

Course Outcomes:

COs	CO Statement
CO1	To obtain basic idea about logic gates.
CO2	To obtain knowledge arithmetic and combinational circuits.
CO3	To have a thorough understanding of the basic structure and operation of a digital computer.
CO4	To study the different ways of communicating with I/O devices and standard I/O interfaces.
CO5	To study the hierarchical memory system including cache memories and virtual memory.

Unit I   **12 Hours**

Digital Logic: The Basic gates-NOT, OR, AND; Universal Logic gates-NOR, NAND - **Combinational Logic Circuits:** Boolean law and Theorems; Sum-of-Products method; Truth table to Karnaugh Map; Pairs, Quads and Octets; Karnaugh Simplfications; Don't care Conditions; Product of Sum Method; Product of sums simplification.

Unit II   **12 Hours**

Number Systems and Codes: Binary Number system; Binary-to-decimal Conversion; Decimal-to-Binary Conversion; Octal Numbers; Hexadecimal Numbers; The ASCII Code; The Excess-3 code.

Arithmetic Circuits: Binary Addition; Binary Subtraction; 2'S complement representation; Arithmetic Building Blocks.

Unit III   12 Hours

Flip-Flops: RS flip-flop; Gated flip-flops; Edge-triggered JK Flip-flops; JK Master-SlaveFlip-flops.
 Registers: Types of registers;Serial In-Serial Out; Serial In-Parallel Out
 Counters: Asynchronous Counters; Synchronous Counters.

Unit IV   12 Hours

Basic structure of Computers: Computer types; Functional units; Basic operational concepts; Bus Structures; Software; Historical Perspective.
Machine Instructions and Programs: Memory Locations and Addresses; Memory operations; Instructions and Instructions Sequencing; Addressing modes; Assembly Language; Basic Input/Output Operations.
Input/Output organization: Accessing I/O devices; Interrupts; Direct Memory Access (DMA); Buses; Interface Circuits.

Unit V   12 Hours

The Memory System: Some Basic Concepts; Semiconductor RAM Memories; Read-Only Memories; Cache Memories; Virtual Memories; Secondary Storage.
Basic Processing Unit: Some fundamental concepts; Hardwired Control; Microprogrammed Control.
Pipelining: Basic Concepts; Data Hazards; Instructional Hazards.

Text Books

1. Donald P Leach, Albert Paul Malvino, GoutamSaha, "Digital Principles and Applications", McGraw Hill Education Pvt. Ltd, Eighth Edition, Sixth Reprint 2016.

Unit I	2.1, 2.2, 3.1 to 3.8
Unit II	5.1, 5.3, 5.5 to 5.9, 6.1, 6.2, 6.5, 6.7
Unit III	8.1, 8.2, 8.5, 8.8, 9.1 – 9.3, 10.1, 10.3

2. Carl Hamacher, ZvonkoVranesic, SafwatZaky, "Computer Organization", McGraw-Hill Higher Education, Fifth Edition, 2012.

Unit IV	1.1 - 1.5, 1.8, 2.2 - 2.7, 4.1, 4.2, 4.4, 4.5, 4.6
Unit V	5.1 - 5.3, 5.5, 5.7, 5.9, 7.1, 7.4, 7.5, 8.1 – 8.3

Reference Books:

1. M.Morris Mano, "Digital Logic and Computer Design", Pearson Prentice Hall, Thirteenth Impression, 2011.
2. S.Salivaganan, S.Arivalagan, "Digital Circuits and Design", Vikas Publishing House Pvt. Ltd., Third Edition, 2007.
3. M.Morris Mano, "Computer System Architecture", Pearson Prentice Hall, Third Edition, 2006.

e– Resources:

1. https://www.youtube.com/watch?v=3zvINQUdUns&t=124s

2. https://www.tutorialspoint.com/digital_circuits/digital_circuits_logic_gates.htm

3. https://www.javatpoint.com/digital-electronics

4. https://docs.google.com/file/d/0B8-drkZsESDnN2NmYTQxYjQtYTMwZi00N2IzLTkxNjgtZjI1NTZiN2FjNDli/edit?resourcekey=0-Yk8bAsCt9I5epBNFTG8KMQ

5. https://www.javatpoint.com/computer-organization-and-architecture-tutorial

6. https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/

7. https://nptel.ac.in/courses/106/106/106106092/

Allied 3 - COMPUTER BASED FINANCIAL ACCOUNTING

Course Title: Computer Based Financial Accounting	Total Hours :60 Hours
Course Code : U24CCAA31	Total Credits : 3

Course Outcomes:

Cos	CO Statement
CO1	Explain the basic concepts of financial accounting
CO2	Apply accounting concepts and conventions to prepare books of accounts
CO3	Identify the financial position of the business by preparing Trading, Profit and Loss account and Balance Sheet
CO4	Familiar with Tally and its applicability in Business
CO5	Able to create company, enter the accounting voucher entries and also print statement of reports like Trial Balance, Profit and Loss account and Balance Sheet.

Unit I   **12 Hours**
Financial Accounting: Meaning, Nature and scope, Limitations – Accounting Principles: Basic Concepts and Conventions-Objectives of accounting-Accounting rules.

Unit II   **12 Hours**
Books and records: Recording of business transactions –Types of accounts – Journal – Ledger – Journal Vs ledger. Subsidiary books – Trial balance.

Unit III   **12 Hours**
Final Accounts: Introduction – Trading account – Profit and loss account – Balance sheet. (Simple problems)

Unit IV	12 Hours

Introduction to Tally: Features of Tally 9 – Company info: Create, Select, Alter and Close or Shut Company – Ledger Creation: Creating, Displaying, Altering and Deleting. F11 – Features and F12- Configuration

Unit V	12 Hours

Voucher Creation: Receipt, Payment, Contra, Journal, Sales, Purchase, Memo, Display, Alter, Delete, Insert. Statement of Reports: Trail balance, Profit and Loss account, Balance sheet.

Note: Distribution of Marks - Theory - 60% and Problems - 40%

Text Books:

1. T.S.Reddy&Dr.A.Murthy, "Advanced Accountancy", Margham Publications, 2019 Reprint

2. Dr.NamrataAgrwal, "Comdex Tally 9", Dream Tech, 2014

Unit	Book	Page No.
I	T.S.Reddy&Dr.A.Murthy, "Advanced	1.1 – 1.8, 2.1 – 2.11
II	Accountancy", Margham Publications, 2019	3.1-3.20,4.1 – 4.6
III		12.1 -12.20
IV	Dr.Namrata Agrwal, "Comdex Tally 9", dream tech,	57-78
V	2014	111-146,119-208

Reference Book:
Financial Accounts - R.S.N.Pillai and Bagavathi, S.Chand, 2007

e-Resources:

1. https://www.youtube.com/watch?v=mq6KNVeTE3A
2. https://www.youtube.com/watch?v=jnlHBpZ-ulQ
3. https://www.youtube.com/watch?v=K9m0ZGFUb9c
4. https://www.youtube.com/watch?v=p7p1J8zC9SY
5. https://www.youtube.com/watch?v=lRq58tmMpJc
6. https://www.youtube.com/watch?v=OgpjFFEqL5E
7. https://www.youtube.com/watch?v=mhvd19FcXGk
8. https://www.youtube.com/watch?v=_0FqS3WYTeE

Core 8 – LAB: JAVA PROGRAMMING

Course Title : LAB: Java Programming	Total Hours :60 Hours
Course Code : U24CACP31	Total Credits : 2

Course Outcomes:

COs	CO Statement
CO1	Use the syntax and semantics of java programming language and basic concepts of OOP.

CO2	Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.
CO3	Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes.
CO4	Designing Enterprise based applications by encapsulating an application's business logic.

List of Programmes:

1. Develop a java program to demonstrate looping statements.
2. Develop a java program to demonstrate command line argument.
3. Develop a java program for using one dimensional array.
4. Develop a java program for using two dimensional arrays.
5. Develop a java program to demonstrate method overloading.
6. Develop a java program to demonstrate method overriding.
7. Develop a java program to implement super keyword.
8. Develop a java program to demonstrate string manipulation.
9. Develop a java program to demonstrate single inheritance.
10. Develop a java program to demonstrate multilevel inheritance.
11. Develop a java program to demonstrate interface.
12. Develop a java program to demonstrate packages.
13. Develop a java program to demonstrate multithreading.
14. Develop a java program to demonstrate built-in exception.
15. Develop a java program to demonstrate user defined exception.
16. Develop a java program to perform applet animation.
17. Develop a java program to demonstrate graphics class.
18. Develop a java program to demonstrate streams.
19. Develop a simple snake game in java.

SBE – 3 – LAB: Web Design

Course Title : **LAB: Web Design**	Total Hours : **30 Hours**
Course Code : **U24CASP31**	Total Credits :**2**

Course Outcomes:

COs	CO Statement
CO1	Understand the important HTML tags for designing static pages and seperate design from content using Cascading Style sheet.
CO2	Design and develop web pages using CSS styles, internal and/or external style sheets.
CO3	Develop interactive web pages using Tables and Forms.
CO4	Implement different types of Layouts in developing a web page.
CO5	Able tocreate a website using HTML & CSS.

1. Create a simple webpage using formatting tags.
2. Create a simple webpage using paragraphs and headings tags.
3. Create a simple webpage using lists tags.

4. Create a simple webpage using images.
5. Create a simple webpage using tables.
6. Create a simple webpage using forms
7. Create a simple webpage using hyperlinks.
8. Create a simple webpage using CSS.
9. Create a webpage to implement operators in javascript.
10. Create a webpage to implement conditionals in javascript.
11. Create a webpage to implement looping statements in javascript.
12. Create a webpage to implement arrays in javascript.
13. Create a webpage to implement functions in javascript.

SEMESTER - IV

Core 9 - RELATIONAL DATABASE MANAGEMENT SYSTEM

Course Title : Relational Database Management System	Total Hours :60 Hours
Course Code : U24CAC41	Total Credits : 4

Course Outcome:

CO1:	Understand the basic concepts and the applications of database systems.
CO2:	Ability to define a problem at the view level and ability to understand the physical structure of the database to handle data.
CO3:	Utilize the knowledge of basics of SQL and construct queries using SQL.
CO4:	Ability to normalize the database and understand the internal data structure.
CO5:	Apply Relational Database theory and be able to write Relational Algebra expressions for queries.
CO6:	Use design principles for logical design of database using E-R method

Unit I   **12 Hours**
Introduction to Database Management System (DBMS): Introduction; Need of a Database ; Characteristics of data in a database ;Database Management System ;Purpose of DBMS ;Types of DBMS.
Introduction to Relational Database Management System (RDBMS): Introduction ;RDBMS Terminology; The Relational Data Structure; Relational Data Integrity ;Relational Data Manipulation; Codd's Rules.

Unit II   **12 Hours**
Database Architecture and Data Modeling: Introduction; Conceptual, Physical and Logical database models ;Database Design ;Design Constraints ;Functional Dependencies.

Entity Relationship Modeling: Introduction; E-R Model; Components of an ER Model; ER Modeling Symbols.

Data Normalization: Introduction ;First Normal Form (1NF); Second Normal Form (2NF) ;Third Normal Form (3NF) ;Boyce-Codd Normal Form (BCNF) ;Fourth Normal Form (4NF) ;Fifth Normal Form (5NF) ;Domain Key Normal Form (DKNF); Denormalization.

UNIT III   **12 Hours**

Relational Algebra and Relational Calculus: Relational Algebra; Relational Algebraic Operations; Relational Calculus ;Tuple Relational Calculus; Domain Relational Calculus.
Introduction to Structure Query Language(SQL): Introduction;History of SQL;Characteristics of SQL;Advantages of SQL;SQL in Action; SQL Data Types and Literals;Types of SQL Commands ;SQL Operators ;Arithmetic Operators;Comparison Operators;Logical Operators;Set Operators;Operator Precedence.
Tables, Views and Indexes: Tables;Views;Indexes
Queries and Subqueries: Queries;Subqueries.

Unit IV   **12 Hours**

Aggregate Functions: Introduction; General rules;COUNT() and COUNT(*);SUM() ;AVG();MAX() and MIN().
Insert, Update and Delete operations: Introduction; INSERT statement; Bulk inserts of data; UPDATE statement; DELETE statement.
Joins and Unions: Joins; Unions
Triggers - Introduction; Need Trigger; Types of Triggers; Trigger Syntax; Combining Trigger Types; Setting Inserted Values; Disabling and Enabling Triggers; Replacing Triggers ;Dropping Triggers; Advantages and Limitations of Triggers.

Unit V   **12 Hours**

Database Security: Introduction ;Database Environment; Data Security Risks ;Complex User Management Requirements ;Dimensions of Database Security; Data Security Requirements; Data Base Users; Protecting the Data within the Database; Granting and Revoking the privileges and Roles; Data Encryption; Database Integrity; System Availability Factors; Best Security Practices; Network Security; Authentication Users to the Database; Security Auditing.

Backup and Recovery: Introduction; Database Backups; Need of Plan Backup ;Hardware Protection and Redundancy; Transaction Logs ;Importance of Backups; Database Recovery; Data Storage; Cause of Failures; Recovery concepts and Terminology; Recovery Facilities; Recovery Techniques; Detached Transaction Actions; Recovery in Multi-Database Systems; Database Recovery from Catastrophic Failures.

Text Books:
1) Alexis Leon and Mathews Leon, Leon Vikas. *Database Management Systems*. Chennai: 2002.

Unit I	Chapter 5, 7.
Unit II	Chapter 8,9,11.
Unit III	Chapters 12,14,15,17
Unit IV	Chapters 18, 19, 21,25.
Unit V	Chapters 27, 30.

Reference Books:

1. Peter Rob, Carlos Coronel .*Database System concepts*. First Edition, Publishing Cengage Learning; 2008.
2. Nilesh Shah. *Database Systems using Oracle*. Second Edition, Published by PHI Learning; 2010.

e – Resources:

1. https://www.javatpoint.com/dbms-tutorial
2. https://www.tutorialspoint.com/sql/sql-databases.htm
3. https://www.javatpoint.com/what-is-oracle
4. https://www.youtube.com/watch?v=HXV3zeQKqGY
5. https://www.youtube.com/watch?v=c5HAwKX-suM
6. https://tamimdba.wordpress.com/relational-database-management-system-material/

Core 10 - DATA STRUCTURE

Course Title : Data Structure	Total Hours :60 Hours
Course Code : U24CAC42	Total Credits : 4

Course Outcome:

COs	CO Statement
CO1	To understand the basics of Data Structures.
CO2	To gain knowledge about Linked lists and Stacks.
CO3	To learn the working of queues and trees.
CO4	To gain knowledge about graphs.
CO5	To understand the sorting and searching techniques.

Unit I   **12 Hours**
Introduction and overview: Definitions; Concept of Data Structures; Overview of Data Structures; Implementation of Data Structures.
Arrays: Definition; Terminology; One Dimensional Array; Multidimensional arrays: Two Dimensional Arrays.

Unit II   **12 Hours**
Linked Lists: Definition; Single Linked List; Circular Linked List; Double Linked Lists; Circular Double Linked List.
Stacks: Introduction; Definition; Representation of stack; Operations of Stack.

Unit III   **12 Hours**
Queues: Introduction; Definition; Representation of Queues; Various Queue structures.
Trees: Basic Terminologies; Definition and Concepts; Representation of Binary Tree; Operations on a Binary tree; Types of Binary Trees: Binary Search Tree, Heap Tree; B Trees.

Unit IV   **12 Hours**
Graphs: Introduction; Graph Terminologies; Representation of Graphs; Operations of Graphs.

Unit V	**12 Hours**

Sorting: Basic Terminologies; Sorting Techniques; Straight Insertion Sort; Heap Sort; Bubble Sort ;Quick Sort; Merge Sort.

Searching: Basic Terminologies; Linear search with Array; Binary Search.

Text Book:

Debasis Samanta, " Classic Data Structures", PHI Learning Private Ltd, Second Edition, 29th Printing 2012.

Unit I	Chapter 1(1.1, 1.2,1.3, 1.4) Chapter 2(2.1,2.2,2.3,2.4.1)
Unit II	Chapter 3(3.1,3.2,3.3,3.4,3.5) Chapter 4(4.1,4.2,4.3,4.4)
Unit III	Chapter 5(5.1,5.2,5.3,5.4) Chapter 7(7.1,7.2,7.3,7.4,7.5.2,7.5.3,7.7)
Unit IV	Chapter 8(8.1,8.2,8.3,8.4)
Unit V	Chapter 10(10.1, 10.2, 10.3.1, 10.4.3, 10.5.1, 10.5.4, 10.7.3) Chapter 11(11.1,11.2.1,11.2.4)

Reference Books:

1. Chithra,P.T.Rajan,"DataStructure",VijayNicholePvtLtd,2006.
2. Horowitz, Sahni, Anderson-Freed,"Fundamentals of Data Structres in C", UniversityPressPrivateLimited,Second Edition 2008.

e-Resources:

1.   http://www.tutorialspoint.com/data_structures_algorithms
2.   http://www.geeksforgeeks.org/data-structures/
3.   http://www.studytonight.com/data-structures/
4.   http://www.coursera.org/specializations/data-structures-algorithms

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Allied 4 – PRINCIPLES OF COSTING

Course Title: Principles of Costing	**Total Hours : 60 Hours**
Course Code : U24CCAA41	**Total Credits : 3**

Course Outcomes:

COs	**CO Statement**
CO1	State the basic concepts of cost accounting and cost sheet
CO2	Determine the various stock levels and Economic Order Quantity
CO3	Explain the labour turnover rate and Methods of Remuneration
CO4	Prepare the procedure relating to the analysis of marginal cost
CO5	Recommend the management in the decision-making process through the Budget

Unit I	**12 Hours**

Introduction to Cost Accounting: Meaning and Definition - Objectives - Scope - Advantages - Cost Terms and Concepts - Elements of Cost - Methods of Costing - Difference between Financial Accounting Vs. Cost accounting - Preparation of Cost Sheet (Simple Problems only).

Unit II   **12 Hours**
Material Cost: Meaning of Material Control - Essentials of Material Control - Determination of Stock level – (Minimum level, Maximum level, Re-order level, reorder quantity and danger level) - EOQ - Techniques of Inventory Control (FIFO, LIFO and Simple average)

Unit III   **12 Hours**
Labour Cost: Meaning – Classification of Labour - Methods of Remuneration – Methods of Remuneration – Time Rate System – Piece Rate System – Differential Piece rate system (Taylor and Merrick) - Incentive and Bonus Plan –Halsey Plan – Halsey Weir Plan – Rowan Plan.

Unit IV   **12 Hours**
Marginal Costing – Meaning – Features – Advantages – Disadvantages – P/V ratio - Break Even analysis – Assumptions - Chart– Margin of safety.(Simple problems only)

Unit V   **12 Hours**
Budget and Budgetary Control: Meaning – Objectives – Characteristics – Essentials of a Successful Budgetary control – Preparation of Sales Budget – Production Budget – Cash Budget – Flexible Budget

Note: Distribution of Marks - Theory - 40% and Problems - 60%

Text Book:

R.S.N. Pillai and Bagavathi, "Cost Accounting", S. Chand Publications, 2018 Reprint

Unit I	Pg. No. 4, 5, 7 – 10, 20 – 24, 26 – 32, 39 - 50
Unit II	Pg. No. 67, 68, 82 – 89, 112 – 120
Unit III	Pg. No. 163 – 179, 186 - 193
Unit IV	Pg. No. 570 – 591
Unit V	Pg. No. 665 – 687

Books for Reference:

1. A, Murthy and S. Gurusamy, "Cost Accounting", Vijay Nicole Publication, 2018 Reprint
2. S.P Jain and K.L Narang, "Cost Accounting", Kalyani Publications, 2018 Revised Edition.
3. M Y Khan and P K Jain, "Cost Accounting", Mc Graw Hill Education, 2015
4. T.S Reddy and Y Hari Prasad Reddy, "Cost Accounting", Margam Publications, 2021 Reprint.

e-Resources:

1. https://www.tutorialspoint.com/accounting_basics/cost_accounting_introduction.htm
2. https://www.javatpoint.com/cost-accounting

3. https://www.accountingtools.com/articles/cost-accounting-basics.html
4. https://icmai.in/upload/Students/Syllabus2016/Inter/Paper-8-New.pdf
5. https://www.icsi.edu/media/webmodules/publications/FULL_BOOK_PP-CMA-2017-JULY_4.pdf
6. https://static.careers360.mobi/media/uploads/froala_editor/files/Material-Cost.pdf
7. https://www.lkouniv.ac.in/site/writereaddata/siteContent/202005291333529297audh-COST-ACCOUNTING.pdf

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CORE LAB – 11 – LAB: RELATIONAL DATABASE MANAGEMENT SYSTEM

Course Title: LAB: Relational Database Management System	Total Hours : 60 Hours
Course Code : U24CACP41	Total Credits : 2

Course Outcomes:

COs	CO Statement
CO1	Execute the query and design database using SQL DML/DDL commands
CO2	Transform integrity constraints on a database using a SQL Query
CO3	Execute PL/SQL Programmes including Exception Handling, cursors and Triggers.

SQL

1) Data Definition Language (DDL) Commands.

2) Data Manipulation Language (DML) Commands.

3) Data Control Language (DCL) Commands.

4) Transaction Control Language Statements (TCL).

5) SQL Built-in Functions.

6) Join Operations.

7) Subqueries

PL/SQL

1) Implement PL/SQL program using different statements.

2) Implement PL/SQL program using Exception Handling

3) Implement PL/SQL program using Cursor.

4) Implement PL/SQL program using Triggers.

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Virudhunagar – 626 001.

SBE – 4 – LAB: DATA STRUCTURES

Course Title : LAB: Data Structures	Total Hours :30 Hours
Course Code : U24CASP41	Total Credits : 2

Course Outcome:

COs	CO Statement
CO1:	To understand the basics of Data Structures.
CO2:	To understand the Sorting techniques.
CO3:	To gain knowledge about Stacks and Queues.
CO4:	To learn the working of Trees and Linked List.

1. Program to implement Exchange Sort using Arrays.
2. Program to implement Insertion Sort using Arrays.
3. Program to implement Selection Sort using Arrays.
4. Program to implement Structures.
5. Program to implement Stack Operations.
6. Program to implement Queue Operations.
7. Program to convert infix expression to postfix expression using Stack.
8. Program to implement Binary Tree Traversal.(Inorder,Preorder,Postorder)
9. Program to search a given number using Linear search.
10. Program to search a given number using Binary search.
11. Program to implement Binary Search Tree.
12. Program to implement Single Linked List.
13. Program to implement Circular linked List.

e-Resources:
1. https://www.geeksforgeeks.org/data-structures/
2. https://www.programiz.com/dsa
3. https://www.geeksforgeeks.org/learn-data-structures-and-algorithms-dsa-tutorial/
4. https://www.tutorialspoint.com/data_structures_algorithms/index.htm

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